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NOTES ON SOME AMPHIBIANS IN WESTERN NORTH
AMERICA.

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Definite information concerning the amphibians of Western North America is rather recent, not only along the lines of habits and of distribution but even of taxonomy. The work of Camp (1915-1917) established a fundamental systematic groundwork in those cases which most needed it, and with the publication of Storer's *Synopsis of the Amphibia of California* in 1925 many life-histories and a great amount of distributional data became known for the first time. Slevin's recent work, *The Amphibians of Western North America*, 1928, adds much to our knowledge of distribution.

There are yet considerable gaps to be filled, however, and little apology seems necessary for the present notes. They are largely distributional and are based on the collections of the Natural History Museum at Stanford University which for a time ranked as the most complete on the Pacific Coast. They formed the basis for Van Denburgh's earlier work on western reptiles and to a considerable extent supplied records for his and Slevin's recent monographs. Much interesting material, however, has as yet never been identified or recorded and some of this is here included. A few records are based on field work the writer has been able to accomplish during the last two years. No material is recorded which does not appear to add distributional or other data.

***Triturus torosus* (Eschscholtz).**

A large number of metamorphosing water dogs, averaging slightly over 50 mm., were collected about the edges of Lagunita, on the campus, Stanford University, Santa Clara Co., Calif., July 26, 1928. They were

at the water's edge, emerging, and a few under boards a few feet from the edge. Next to *Hyla regilla*, this is the commonest amphibian of the San Francisco Bay region, and, as the Hylas are secretive most of the year, it is easily the most generally known.

For notes on this species at Rancho del Oso, see under *Dicamptodon*.

***Ambystoma tigrinum californiense* (Gray).**

The night of March 9, 1929, at Lagunita, Stanford Campus, in a drizzling rain, a single large male was seen hastily making for the water. He was a hundred yards from the edge when first observed, but as I was not prepared to follow out to any depth to observe his movements he was collected. The cloacal region was greatly swollen, and the animal evidently was in breeding condition. No other specimens were observed, in the water or out, although many may have been present in deeper water. This indicates either a belated individual or a later spawning than of Storer's account. Possibly unusual rainfall conditions may have contributed. (See account under *Ensatina eschscholtzii*.)

We have other specimens of this salamander from Palo Alto and San Jose, Santa Clara Co., Calif. These California *tigrinum* are rather different in appearance from Long Island examples that I have seen, but still more so from some of the large-spotted specimens from the Rockies.

***Ambystoma gracile* (Baird).**

A fine specimen, 185 mm., from Chinook, Pacific Co., Washington, C. H. Gilbert.

***Ambystoma macrodactylum* (Baird).**

Among several specimens from Pullman, Washington, March 31, 1894, J. O. Snyder, is one female with ripe eggs, indicating spawning time.

***Dicamptodon ensatus* (Eschscholtz).**

One adult, 228 mm., from Albion, Mendocino Co., James McMurphy; one adult, 218 mm., from Rancho del Oso, Santa Cruz Co., March 28, 1922, Theodore J. Hoover; 8 gilled larvae, 189-245 mm., from Middle Creek, Siskiyou Co., July 30, 1921, J. O. Snyder and Blake Wilbur; 3 small larvae, 57 to 72 mm., Mt. Lassen, Hollensworth Flat near Shingletown, Shasta Co., June 20, 1900, E. Hughes; all in California.

The large larvae are of interest as throwing some light on the size at metamorphosis. As Storer has suggested, it is apparent that in this form the larvae attain almost or quite adult size before transforming. It appears to be of advantage to such a large salamander to prolong its larval life, for it gains not only in protection from enemies but in escape from dessication, which is possible even in some parts of the redwood forests.

One adult (No. 61) from Steven's Creek Canyon, Santa Clara Co., Calif., is remarkable for its small size, 153 mm.

On March 17, 1929, Mr. Merrill W. Brown and the writer proceeded to Rancho del Oso where we hunted salamanders with the kind permission of

its owner, Prof. Theodore J. Hoover. The ranch comprises the entire valley of Waddell Creek, a small stream flowing directly into the ocean at the northern end of Monterey Bay in Santa Cruz County. Except for a short distance at the mouth, the valley is in the redwood belt, kept continually moist by the dense ocean fogs. Going a few miles up the creek we soon began to find salamanders. *Triturus torosus* was leaving the water by the hundreds and the animals, apparently of at least two-year classes (of 80 or 90 mm. and large adults), were seen everywhere crawling over the ground or found resting under logs. A number of *Ensatina eschscholtzii*, *Aneides flavipunctatus* and *Batrachoseps attenuatus* were taken. Towards the end of the afternoon a light rain began to fall. We stopped at a small branch stream and began turning over logs. Over a little spring, piled on the almost vertical incline of the wet canyon slope, were some long strips of redwood. Clambering up and turning these over I uncovered a large adult *Dicamptodon*. It was the first I had seen alive and its size, together with its strength when seized, will remain a lasting impression. In preservative it measures 220 mm.

Mr. Hoover tells me that *Dicamptodon* is rare, but that individuals are occasionally uncovered when clearing up rubbish in the woods. One such that he obtained is in the collection. He further states that the animal utters a noise or "bark" and says that he has had his attention called to specimens in this way.

Another adult, taken under a board by the roadside along the Santa Cruz-Los Gatos road, 15 miles from Los Gatos and 5 miles from the Big Basin road, March 24, 1929, G. S. Myers, measures 210 mm. with injured tail.

Batrachoseps attenuatus attenuatus (Eschscholtz).

Numbers of these salamanders are to be found under boards or chips about Palo Alto or in the nearby hills wherever there is sufficient moisture. The largest that I have seen measures 140 mm., of which 85 mm. is tail; it was taken on the Stanford Campus by G. M. Kranzthor, March 29, 1929. Also from La Honda, San Mateo Co., March 9, 1929, M. W. Brown and G. S. Myers; Rancho del Oso, Santa Cruz Co., March 17, 1929, Brown and Myers; and Santa Cruz-Los Gatos road, 15 miles from Los Gatos, March 24, 1929, G. S. Myers.

The characteristic manner in which *Batrachoseps* curls up when disturbed reminds one forcibly of the similar habit of *Hemidactylium* and suggests that the close relationship assumed by older writers may have some basis in fact.

Mr. Lionel A. Walford has very kindly turned over to me the following observations on the breeding habits of this species as observed by him at Berkeley in 1925.

"When the first rains occur, usually in November or December, *B. attenuatus* comes to the surface for the mating season. I have observed during the winter months a pairing off of individuals, many such pairs being seen close together under rocks and boards. I have seen young as early as October.

"On January 24, 1925, I found some eggs about a foot below the surface of the ground under some dense foliage. There seemed to be no pocket or excavation for the reception of the eggs and they closely resembled the surrounding earth. They were in two groups close together, one of seven eggs and the other of twelve. The eggs were about five or six millimeters in diameter, and appeared round. On February seventh seven individuals were hatched. They broke the other eggs in hatching. Little was left of the broken eggs and it is possible these were eaten. The young were seventeen millimeters in length when hatched and were of the same general color and form as the adults. On March 25 they were 22 millimeters long."

Batrachoseps attenuatus leucopus (Dunn).

One, 80 mm., from Dulzura, San Diego Co., California. This specimen, a male, exhibits swollen areas about the naso-labial grooves, but there appears to be no external manifestation of a glandular swelling in the mental region.

Ensatina eschscholtzii Gray.

On March 9, 1929, Brown and I hunted salamanders at La Honda. The winter rains had been light and none had fallen for a month until that morning. About 500 yards down the creek from the village we began turning over redwood chips and bark. In a half hour's collecting we obtained nine *Ensatinas* and more than twice that many *Batrachoseps*. The steady drizzle had not yet much wet the ground beneath the big redwoods and it was rather dry under the chips. All of the *Ensatinas* were under flat chips or pieces of bark one or two feet long lying rather loosely on the forest floor. None were under deeply embedded slabs or logs. Two of the specimens were young of the year, under 40 mm., while of the seven adults, four were males and three females. All were taken in an area approximately 100 ft. square, this being apparently the one place in the immediate neighborhood where sufficient shelter was to be found.

The upper surfaces of the specimens are of a slightly variable shade of deep burnt orange, this fading to bright orange on the lower parts of the cheeks, sides and tail. On the venter the color is slightly paler, the skin translucent, and the internal organs visible. The proximal half of each leg is of the same bright orange as the sides. The upper eyelids of some of the specimens have an orange infusion and on some there are indications or orange spots on the upper surface of the tail. The iris is black, but directly above the pupil it is suffused with minute metallic greenish-silvery specks. The young *Ensatinas* were more brilliant than the adults. The basal bright orange tone is less obscured above by dark chromatophores.

In captivity the four males were distinctly more active than the females, especially when one attempted to handle them. The swollen region on each side of the snout and the consequent overhanging folds of the upper lip were very noticeable.

In this species the naso-labial groove does not extend to the edge of the

lip, but bifurcates and sends a branch anteriorly and one posteriorly along the swollen part of the lip, these branches soon becoming obsolete. In the female the branches are much less distinct.

Five adults taken at Rancho del Oso (see under *Dicamptodon*) were of a much paler color, being a pale dull brown above and pale yellowish orange beneath. The proximal parts of the legs were yellowish orange. The three young likewise showed none of the brilliant color of the La Honda specimens, resembling the adults. Adults taken in Big Basin, Santa Clara Co., March 24, 1929, and along the Santa Cruz-Los Gatos road, 15 miles from Los Gatos, on the same date, resembled the La Honda ones in coloration. An adult, 113 mm., Salem, Marion Co., Ore., January 29, 1921, C. D. Duncan, adds a locality.

A color description of the young may be of interest. In the La Honda specimens the ground color is bright orange-red. The darker color of the dorsum and distal parts of legs is caused by small dark spots each covering one skin pit. The dots are always on the pits but not all pits are spotted, the dark thus being somewhat irregular. There are a few golden spots on the proximal lighter parts of the legs. There is a very sparse sprinkling of fine white dots over the back and sides. In the Rancho del Oso young the coloration is in every way similar except that the ground color is yellow and the dark of the upper surfaces is deeper, more dark pit-spots being present.

Ensatina sierræ Storer.

A fine specimen, 130 mm., De Sabla Power House, Butte Co., 22 miles northeast of Chico, Calif., February 5, 1918, L. M. Edwards. The following are life color notes by Prof. J. O. Snyder. Body dark violet black; feet, ventral sides of limbs and under parts very pale; spots and blotches of body mars orange; proximal segments of legs with yellow infusion; sides of body with many minute spots of silvery white.

Also five smaller specimens from Fyffe, Eldorado Co., Calif., May 13, 1898, Miss J. C. Nichols. These are interesting in that in three examples the spots are extremely reduced, but a few small scattered ones being present on the upper parts of the sides and on the tail. This brings up the question of possible intergradation with *eschschooltzii* and particularly recalls the specimen in the California Academy, also from Eldorado County, which entirely lacks spots and has been referred to *eschschooltzii* (Slevin, 1928, p. 62). With these facts in mind, and judging from preserved material, we might be justified in reducing *sierræ* to subspecific rank. This does not, however, take into account the widely different life colors of the two forms. *Eschschooltzii* in life is burnt orange or dull brown above and light orange beneath, this subject to slight change with temperature, light, and moisture. *Sierræ*, on the other hand, is described as blackish or violet black above with the spots orange and the limbs and underparts pale. In alcohol *eschschooltzii* darkens and our *sierræ*s from Fyffe are brown after many years preservation, but until it can be shown that there is a meeting place in the life colors of the two forms I think we had best

keep them distinct. VanDenburgh (1916, Proc. Calif. Acad. Sci., VI, p. 220) says the ground color of *croceator* (*sierræ*) may vary "from light brown to nearly black," but whether this refers to preserved or to live animals is not plain.

Dunn has recently described the form in the San Jacinto Mountains and southward as a distinct species, *Ensatina klauberi* (1929, Proc. U. S. Nat. Mus., 74, Art. 25, p. 1). That this form¹ is separated from *croceator* (*sierræ*) by the southern extremity of the range of *eschscholtzii* seems at first sight to be clear, but it is not yet wholly certain that a spotted *Ensatina* does not occur in the San Bernardino along with *eschscholtzii*. I have examined a single *klauberi* in the California Academy; it appears blacker and more brilliant than *croceator* (*sierræ*).

Aneides ferreus Cope.

A series of 34 specimens collected by J. O. Snyder and C. V. Burke at Union Bay, Bayne Island, British Colombia, May 16, 1906, ranges from 33 to 117 mm., and forms the bulk of the original lot from which the specimens from this locality in the California Academy and National Museum came. The adult coloration varies somewhat in tone but the mid-dorsal line is always somewhat obscured. The young have a pair of light areas on the snout and head to level of middle of eye, a light stripe on each side of the neck in the parotoid region, a light area on the upper proximal part of each hind leg, and a dorsal light stripe on the tail.

Aneides flavipunctatus (Strauch).

As stated under *Dicamptodon*, we hunted salamanders at Rancho del Oso on March 17, 1929. Three large adults of *flavipunctatus*, 126 to 152 mm., were obtained under logs and slabs, as well as two young, of 41 and 43 mm. The adults were totally black save for one or two small whitish spots on the legs. The young were spotted, resembling spotted adults from northern California. All adults south of San Francisco Bay seem to be unspotted.

In the young the color appears blackish, somewhat pale beneath, with a fine peppering of tiny blue-white flecks, both above and below. Under the binocular it is seen that the skin is finely and evenly covered with small deep pits. The ground color is coal black, while between the pits there is a fine broken golden tracery, each group of radiating lines apparently representing a single golden chromatophore. Over all is an irregular peppering of tiny blue-white spots, each but little larger than a skin pit. On the venter there is no golden tracery and the pits seem to become light, thus giving the lighter color to the under side.

¹The present paper was written before Storer's "Notes on the genus *Ensatina* in California," 1929, Univ. California Publ. Zoöl., 30, No. 16, pp. 443-452, had appeared. I have adopted his name *sierræ* for the Sierra form, agreeing with him in the application of the name *croceator* to the southern species. Storer's records confirm the presence of spotted *Ensatinas* in the San Bernardino, true *croceator* ranging from Ft. Tejon southward. Mr. Klauber has very kindly presented the Stanford Museum with one of the series of *croceator* from Descanso from which the type of *klauberi* was taken. They were obtained by Joe Carter, April 1, 1929.

The three adults were kept alive for some time in a jar. One of the smaller received a deep wound in the back, apparently a bite inflicted by one of its fellows. This species is much more active and lizard-like than *lugubris*. The young, especially, in which the legs are proportionately longer than in adults, move in a quick manner that is startlingly lacertilian.

In appearance the two young were very similar to the only young specimen of *Plethodon glutinosus* which I ever saw. I found it under a log on a hill near Sussex (Deckertown), N. J., and it was of approximately the same size as these small *Aneides*.

Storer (Synop. Amphib. Calif., p. 122) states that the range of *flavipunctatus* is in general inland from that of *lugubris*. Exactly the reverse is true south of San Francisco Bay. Here *flavipunctatus* is limited to the coastal redwood belt, while *lugubris* is generally common only interiorly, in the Santa Clara Valley and in the Inner Coast Range.

Two adults from Murphy's Creek, Santa Clara Co., March 31, 1898, W. K. Fisher; one in bad condition from Sherwoods, Mendocino Co., F. Stephens, both in California.

Aneides lugubris lugubris (Van Denburgh).

One specimen, 140 mm., Anno Nuevo Island, near northern end of Monterey Bay, J. O. Snyder, seems worth recording. It almost entirely lacks the yellow spots.

Large specimens of this species when confined in vivaria for a period without food, frequently severely bite their fellows, particularly on the tails, apparently mistaking those members for worms.

Scaphiopus hammondi Baird.

A series of transforming larvae of this species from near Salinas, Monterey Co., California, May 5, 1922, is in the collection. A newly transformed toad measures 31 mm. from snout tip to vent. This is a considerable extension of the range.

Bufo canagicus canagicus (Pallas).

Rana canagica Pallas, 1831, Zoogr. Rosso-Asiat., III, p. 12.¹

Bufo boreas Baird and Girard, 1852, Proc. Acad. Nat. Sci., Phila., 6, p. 174.

It appears that Pallas's name must supplant that of Baird and Girard for the common toad of the Pacific Coast. Lindholm (1924, Copeia, No. 129, p. 46) has called attention to Pallas's description of *Rana canagica* but he did not attempt an allocation of the name. The only two amphibians known from the region ascribed to *Rana canagica* are *Rana cantabrigensis* and *Bufo boreas boreas*.

I present Pallas's description:

¹Zoographia Rosso-Asiatica, sistens Omnium Animalium in Extenso Imperio Rossico et adjacentibus maribus Observatorum—Recensionem, Domicilia, Mores et Descriptiones, Anatomen atque Icones Plurimorum. Auctore Petro Pallas—Volumen Tertium—Petro-poli—In officina Caes. Academiae Scientiarum Impress. MDCCCXI. Edit. MDCCCXXI.

"5. *RANA canagica*.

"*R. subverrucosa*, supra *virescens*, linea dorsali alba, subtus pallida.

"In insulis Aleuticis inter Camtschatcam et Americam, et in hujus Continentis parte a Rossis occupato observavit, et breviter sic descripsit p. m. D. Merk.

"Descr. „Supra corpus virescens, linea alba a capite per dorsum. Subverrucosa, verrucis *ochreo-pallidis*, in juniore aetate rubescentibus, halone fuscido cinctis. Subtus pallida, *subverrucosa*.. (Italics mine.)

Holding in mind the date at which this work was done (before 1811) and the construction of the other descriptions of "*Ranae*" given by Pallas, there seems not a great deal of doubt regarding the application of the name. The parts of the description italicised seem to me to be referable only to *Bufo boreas*. Surely no one would refer to *Rana cantabrigensis* as in any way warty. Pallas even mentions the color of the warts, and those on the back of *boreas* are well described as "*ochreo-pallidis*."

Bufo boreas is recorded from the Prince William Sound region, which is considerably farther north than the Aleutians. There thus seems no reason why *boreas* as well as *cantabrigensis* should not occur on the Islands, Kanaga included. But it is also definitely stated that *canagica* inhabits the mainland and I see no reason for not restricting the type locality to the latter area. Whether or not the Alaskan frogs are subspecifically identical with what we have called *B. boreas boreas* from Oregon and Washington must be decided with more abundant material than that available to me.

Among the numerous toads of this form in the Stanford Museum the following seem worth recording. One, Woronofski Island, near Wrangel, Alaska, June, 1900, collector not recorded. One, Beaver River near Beaver, Beaver Co., Utah.

Slevin (1928, Occ. Pap. California Acad. Sci., XVI, p. 93) referred toads from Lake Tahoe to *halophilus*. Three large adults in our collection from Tahoe City, Lake Tahoe, June 27, 1911, Snyder and Richardson, are definitely referable to *canagicus* (= *boreas boreas*).

***Bufo canagicus halophilus* (Baird and Girard).**

The name of the common toad of California, following the change of the northern subspecies, must be as given.

A single large female, 115 mm., taken at night by the writer at Lagunita, on the Stanford Campus, March 9, 1929, approaches the northern subspecies in several ways, firstly in size, secondly in the extreme roughness of the skin between warts, and thirdly in having a heavy fine black mottling between the larger color spots. Dr. T. I. Storer has examined this individual, however, and pronounces it an *halophilus* on the width of the hind foot. The example was seen at a distance to be different from the numerous other toads in the water and was collected on this account.

***Bufo canorus* Camp.**

On the afternoon of June 20, 1928, search was made in the vicinity of Perego Meadow (elevation 7,100 feet), Yosemite National Park, for this

toad. Although logs and various kinds of cover were thoroughly examined about the meadow, no adults were found. In small muddy holes in the wet meadow, however, innumerable tadpoles were found. The holes were not more than 6 or 8 inches in diameter and were almost filled with fine mud and vegetation. Several tadpoles were in each hole and the holes were so close as to suggest hoof tracks of a herd of cattle. Seepage water kept them filled. The water was very warm, but must have become rather cold at night. Two sizes of tadpoles were observed, the smaller of about 10 mm., the larger being mature tadpoles of 28 or 30 mm. Some of the latter transformed that night, the tiny toadlets measuring 10 mm.

Tadpoles of the smaller size were also observed on the same day at the first small meadow across the ridge from Chinquapin, on the Glacier Point Road, in a shallow place in a little rivulet which crosses the road. Search at Tamarack Flat and along Tamarack Creek on the 19th failed to reveal any sign of adults or tadpoles.

Storer (1925, Synop. Amph. Calif., p. 42) has figured the mouth of the tadpole of *canorus*.

***Hyla arenicolor* Cope.**

Indian Creek, San Jacinto Mts., Calif., July 19, 1927, D. H. Fry, Jr. Also adults and mature and metamorphosing tadpoles from Palm Springs Canyon, Calif., July 18, 1927, D. H. Fry, Jr. We have other specimens from the latter locality, March 28, 1929, J. H. Wales.

***Hyla regilla* Baird and Girard.**

In the winter of 1928–1929 these were first heard in puddles behind the Museum on the Stanford Campus on December 5, in the afternoon. The first rains were a week before, the first to leave standing water only four days before. At Lagunita they were mating as late as March 9. Specimens at hand from Tahoe City, Lake Tahoe, June 27, 1911, Snyder and Richardson, and Rancho del Oso, Santa Cruz Co., March 17, 1929, Brown and Myers, both in California.

***Rana aurora draytonii* (Baird and Girard).**

These large pond frogs seem to be becoming rare. Large ones are occasionally taken at Lagunita, Stanford Campus.

***Rana pretiosa luteiventris* Thompson.**

One fine specimen, Quinn River near McDermitt, Humboldt Co., Nevada, July 30, 1913, J. O. Snyder.

***Rana boylei boylei* (Baird).**

Marshfield, Coos Co., J. O. Snyder, and mouth of Pistol River, Curry Co., August 3, 1899, both in Oregon. Also from Idylwild, Big Sur Road, Monterey Co., Calif., G. S. Myers. Our material from Quincy, Plumas Co., Calif., shows much variation in color and proportions. Some of the speci-

mens approach *sierræ* in the short legs, but though the color varies, it does not approach that of our Yosemite *sierræ*.

These little frogs are fairly common in foothill streams behind Palo Alto. As Camp and Storer have pointed out they are rigidly restricted to streams, *draytonii* and bullfrogs being the only pond frogs of the region.

***Rana boylei sierræ* Camp.**

Along Tamarack Creek above Tamarack Flat (altitude 6,400 ft.) Yosemite National Park, June 19, 1928, these frogs were occasionally seen. One young was taken. Next day, at Peregoy Meadow (7,100 ft.), in tributaries of Bridal Veil Creek, many large adults and many metamorphosing tadpoles were seen. We also have one adult from Mariposa Big Trees, Yosemite National Park (about 6,500 ft.), C. P. Russell, and another from Tahoe City, Lake Tahoe, Calif. (about 6,300 ft.), June 27, 1911, Snyder and Richardson. These various stations are the lowest on record for this form.

***Rana boylei muscosa* Camp.**

Of this well marked subspecies we have two fine adults, Indian Creek, San Jacinto Mts., Calif., July 19, 1927, D. H. Fry, Jr.

***Rana catesbeiana* Shaw.**

Bullfrogs are found along San Francisquito Creek, Palo Alto, possibly having come down from Searsville Lake, where, however, they have not up to the present definitely been observed. When the creek rises and fills Lagunita on the Stanford Campus, a few big frogs usually come with the water and are heard throughout the spring. One large adult, March 20, 1929, M. W. Brown, from Lagunita, is in the collection.